CENTER FOR PERCEPTION AND COMMUNICATION IN CHILDREN

2023 ANNUAL NEWSLETTER

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Boys Town National Research Hospital® established the Center for Perception and Communication in Children (CPCC) in 2014 with support from a Centers of Biomedical Research Excellence (COBRE) grant from the National Institute of General Medical Sciences (NIGMS) under Award Number P20GM109023.



We're proud to share our research team's progress and highlights from this last year!



Letter from the Director

The past year has been very active at the Center for **Perception and Communication in Children (CPCC)at** Boys Town National Research Hospital (BTNRH), supported by an IDeA-affiliated Centers of **Biomedical Research Excellence (COBRE) award** from the National Institutes of Health. We welcomed our final Research Project Lead (Dr. Kathryn Wiseman), held our first completely inperson External Advisory Committee annual meeting since the pandemic and submitted our Phase III application. As the CPCC has grown and evolved. our focus has started to shift towards facilitating scientific collaborations and partnerships with clinicians and community stakeholders. This newsletter highlights the accomplishments of CPCC scientists, progress made towards strengthening the research infrastructure within the CPCC and new initiatives to share what we have learned with our partners.

LORI LEIBOLD, CPCC DIRECTOR

BOYS TOWN National Research Hospital

Research Core Updates

Administrative Core

The Administrative Core (Admin Core) is led by Dr. Lori Leibold and facilitated by an experienced Project Management Team. The Admin Core provides the project management, resource allocation, evaluation framework and scientific oversight required to successfully run the CPCC.

The Admin Core also runs the Pilot Project Program.This program is designed to allow junior researchers to expand their area(s) of



Admin Core: Christine Hamans, Sara Hansen, Lori Leibold, Nina Hjermstad, Angela Collins, Randi Kno

research, increase research participation among all CPCC scientists and develop new technologies. Over the past decade, the CPCC recruited many new and established researchers. This recruitment effort has been supported by the Admin Core and Boys Town National Research Hospital. The research being performed in the CPCC is nationally recognized for improving the lives of children with communication disorders.

Technology Core



Tech Core : Christ Stecker, Won Jang, Denis Fitzpatrick, Seth Bashford & not pictured, Raj Persaud

The CPCC Research Technology Services Core (Tech Core) team consists of Core Lead Chris Stecker, Research Engineering Supervisors Denis Fitzpatrick and Raj Persaud, Research Technology Engineers Seth Bashford and Won Jang, Technology Project Manager Christine Hammans and Audio-Visual Engineer Maurice Bailey. Our team consists of engineers, programmers, scientists and staff with experience in software applications development, signal

processing, digital media design, research hardware and data acquisition and analysis. We have developed research technology for laboratory, web-based and at-home testing with human research participants, machine learning, database integration, and virtual reality. Currently, we are working on developing novel applications in high-performance computing, remote testing, open science and multisensory research paradigms.

Since the inception of the Tech Core, research at Boys Town has grown across disciplines. The Tech Core continues to grow in personnel and expertise to not only provide resources to the CPCC but Boys Town research as a whole.

Participant Core



Participant Core Leadership: Sophie Ambrose, Merry Spratford, Krystal Werfel, Jamie Petersen & not pictured, Trinity Williams

The Participant Core consists of recruitment coordinators, community engagement specialists, research and clinical audiologists and research and clinical speech-language pathologists. Outside the lab, we strive to establish Boys Town in the community by providing free services such as hearing and language screenings. Insidethe lab, we have a centralized team of experts to administer evidencebased clinical assessments and provide efficiency in data collection and recruitment.

The CPCC Participant Services Core (Participant Core) team is led by Krystal Werfel and three program managers, Sophie Ambrose, Clinical Measurement Program; Merry Spratford, Research Recruitment Program; and Trinity Williams, Research-Community Partnerships Program. Research participants are vital partners in the research process and our goal is to shift thinking to a community- engaged research framework to ensure that our research findings are relevant to and representative of our community.



Participant Core Members: Kayla Skaggs, Melissa Henry, Sarah Al-Salim, Natalie Mason, & Victoria Sweeney

Research participants are vital partners in the research process and our goal is to shift thinking to a community-engaged research framework to ensure that our research findings are relevant to and representative of our community.

The Black, Indigenous, and People of Color-Communication Sciences and Disorders (BIPOC-CSD) Network

The Black, Indigenous, and People of Color-Communication Sciences and Disorders (BIOPC-CSD) Network provides a safe affinity space for individuals who are members of BIPOC and other racially/ethnically underrepresented groups working in fields related to communication sciences and disorders. Members include university faculty, scientists, postdoctoral fellows, clinicians, students and engineers.

Within this space, mentorship is offered, and opportunities are provided to share resources, experiences and position openings. The network was founded in 2021 by a team that includes Dr. Monita Chatterjee from the CPCC. The BIPOC-CSD Network is open to anyone working in the fields of hearing, balance, speech and language who are members of the BIPOC/ racial-ethnic minority community.

For more information visit: https://www.monitachatterjee.com/bipoc-csd

Research Project Updates

Kaylah Lalonde, Ph.D., AUDIOVISUAL SPEECH PROCESSING LAB



In the Audiovisual Speech Processing Laboratory, we study how children use visual cues such as lipreading to help understand speech in noisy environments. Part of what makes lipreading so helpful is that we know that certain mouth shapes or movements go with particular speech sounds. For example, we know that you must close your lips to make an "m" sound.

Our study has found that children as young as 4 years old use this type of knowledge to help understand speech in noise, but this knowledge grows in adolescence. We have also found that children who are hard of hearing benefit more from visual speech cues than their peers with typical hearing.

Our team is currently studying why this is the case and what factors impact the degree to which children benefit. We believe that children who have hearing loss at high frequencies or pitches may benefit more from visual cues than children with typical hearing or with hearing loss at low frequencies.

The results of our study will help guide clinical recommendations about the best type of spoken language intervention for individual children with hearing loss.



Our team is currently collaborating with Dr. Monita Chatterjee and the Auditory Prostheses and Perception Lab. We are working on a study using eye tracking to examine visual attention to talkers' faces during speech perception in children with and without cochlear implants. We are excited to have Dr. Devon Pacheco, a T32 postdoctoral fellow, join our team in the new year!

Angela AuBuchon, Ph.D., WORKING MEMORY AND LANGUAGE LAB



Many people talk to themselves (private speech) when trying to solve a problem, control their behavior or remember a goal. Learning to use private speech is especially important for children's executive function and reading development. This year, the Working Memory and Language Lab identified when and how children learn to use two kinds of private speech when remembering.

Fixed rehearsal—immediately repeating what you've just seen or heard—isa type of simple private speech. We observed that children start using this simple strategy around age 4. Sometimes fixed rehearsal can be helpful. For example, if a child is trying to remember something she sees, saying the name will reinforce the image. However, if she is trying to remember something something she hears, saying it again doesn't necessarily help memory (although it can confirm whether she was paying attention). Nonetheless, mastering fixed rehearsal is an important step in developing more sophisticated private speech strategies. Cumulative rehearsal—a more complicated memory strategy—requires repeatedly saying what you want to remember. Most 7-year-olds attempt this strategy. But even attempting this strategy is taxing for children, so they can be easily distracted. For example, children often won't attempt the strategy when they have too many things to remember. Our visiting T35 audiology student, Aimee Miller, found that children's rehearsal is ineffective when background noise is present. Our initial results suggest that children with strong language skills develop private speech at younger ages. We are also working with Dr. Beth Walker from the University of Iowa to understand how private speech develops in children who use cochlear implants.



Hope Lancaster, Ph.D., ETIOLOGIES OF LANGUAGE AND LITERACY LAB



Language is vital to every aspect of our lives. Yet, language is rarely included in large-scale population research studies. This gap is largely driven by the time and resources needed for in-person testing. To address this problem, our team, (Dr. Hope Lancaster, Lab PI; Dr. Alicia Buttner, Lab Manager; and Ryan Parks, Research Assistant) in the Etiologies of Language and Literacy Lab (eL3) are developing an online language tool for speech-language research:

rthe Remote Adult Language-Experiment (ReAL-E). With help from the Tech Core – Dr. Denis Fitzpatrick, Seth Bashford and Christine Hammans, the eL3 team has developed a prototype and made refinements based on user experience testing and expert feedback. The current iteration of the ReAL-E is in beta testing, assessing language in monolingual, bilingual and multilingual speakers of American English.

The eL3 team is collaborating with Dr. Natalie Parde, at the University of Illinois at Chicago to develop automatic scoring models, which will be critical to the adaptation of the ReAL-E for large-scale projects. Our team plans to continue beta testing to assess performance and reliability at the task level and make the ReAL-E more accessible for participants and researchers. Ultimately, we envision the REAL-E being an open science, internet-



based tool for assessing speech-language traits in small- and large-scale projects in multiple disciplines. Our team is planning future refinements of the ReAL-E with these goals in mind. We plan to use the final version of the ReAL-E to examine the genetics of language, language in neurodiverse populations and language and health.

Ellen Peng, Ph.D., FUNCTIONAL HEARING LAB



In the Functional Hearing Lab, we completed data collection of the pilot project in collaboration with Dr. Kristen Janky's Vestibular and Balance Lab. Our pilot project investigates the relationship between balance and spatial hearing (the direction of sound). We are researching those with postural challenges such as vestibular dvsfunction (disturbance in the body's balance system) and how they may

experience difficulties in developing spatial hearing abilities. Vestibular dysfunction has high prevalence in adults and children with severe to profound hearing loss receiving cochlear implants. Nineteen children and young adults diagnosed with bilateral severe to profound hearing loss fitted with bilateral cochlear implants before the age of 5 were recruited in our study along with a control group of 12-14 year-old children and young adults. Each participant underwent a battery of vestibular function assessments; several bilateral cochlear implant users had vestibular dysfunctions. To assess spatial hearing, three psychoacoustic tasks were designed to examine spatial precision, acuity and unmasking abilities under various balance conditions: seated, standing on hard and soft surfaces.

While spatial hearing has been mainly assessed in seated position in laboratory environments, we exercise spatial hearing in many situations with postural challenges during real-world listening. Our project will provide initial insights on the clinical management and (re)habilitation goal for those fitted with bilateral cochlear implants with co-occurring vestibular dysfunction. Our pilot project marks the first study conducted



at the newly established anechoic chamber at Boys Town National Research Hospital and the first investigation into multisensory integration by the Functional Hearing Lab, providing an exciting opportunity to collaborate with other Boys Town Hospital researchers.

Kathryn Wiseman, Ph.D., CHILD AUDITORY TECHNOLOGY LAB



Children who are deaf or hard of hearing (DHH) who use hearing devices often develop communication differently from one another, but we do not always understand why these differences happen. Research in the Child Auditory Technology (CAT) Lab focuses on developmental outcomes of children with hearing loss who use hearing aids and/or cochlear implants. If we can figure out

through research why some kids thrive and others face communication challenges, we can make better recommendations in our clinics to support this population and their families. Currently, we are bringing in children with typical hearing and children with hearing aids ages 6 to 13 years to take part in our study. Once we have collected these data, we will look at how individual differences in ability to hear these complex sounds predict different communication outcomes. These results will help us better individualize hearing assessment, device candidacy and verification and clinical counseling for children with hearing loss and their families.

CHILD AUDITORY TECHNOLOGY LAB

- How do children with hearing aids hear complex sounds that are like the sounds of speech?
- Is it different than children with typical hearing?
- Can this ability help us predict how a child develops the ability to understand speech and use spoken language?

To answer these questions, children participate in activities like those done in audiology or speech-language pathology clinics, such as a hearing test, speech recognition tasks, hearing aid measurements and language assessments.

Research Highlights

Meet Research Assistant, Suresh Portillo

Suresh Portillo grew up in San Francisco, CA. He moved to the Midwest to attend Northwestern College in Orange City, IA, where he studied Spanish Translation and Interpreting and received a specialized certification in translation. Suresh didn't picture himself working in a research environment but when the Human Auditory Development Lab (HADL) had an opening for a bilingual Research Assistant (RA), he found it to be a good fit.



The HADL conducts studies to understand how background noise impacts the speech recognition abilities of Spanish/English bilingual children and adults in both of their languages. For example, if someone is having a conversation at a restaurant, does the noise around the person having a conversation affect their ability to listen in their non-native language? Working with his lab-mates and Dr. Lori Leibold (PI) has provided Suresh with the support to learn more about the field of audiology and the communication needs of bilingual or Spanish-speaking participants. He quickly realized that working in a lab means continually learning and asking more questions.

Bilingual translation and interpreting are important for successful research projects to get minority populations involved in their research. Suresh encourages those who are bilingual to practice their languages to bridge the gap with participants that only speak one language. "While I was in college, I started taking classes taught only in Spanish. I quickly realized, I wasn't as bilingual as I thought I was." Suresh looks forward to continuing to educate communities about the importance of research and encouraging them to participate.

"Working in research has taught me there is still a lack of information about what research is and what it involves. People hear the word "research" and think of something invasive. We need to continue to reach out to minority and rural populations to teach them about our research and get
them involved in participating."

Awards





Kaylah Lalonde, Ph.D.

Ryan McCreery, Ph.D.

- COBRE Phase II Research Project Lead, Kaylah Lalonde, Ph.D., received the Early Career Research Award from the American Auditory Society.
- COBRE Phase II, Co-Director, Dr. Ryan McCreery received the 2023 Educational Audiology Association (EAA) Frederick S. Berg Award.





Monita Chatterjee, Ph.D. Karla McGregor, Ph.D.

- COBRE Phase II, Core Director, Dr. Monita Chatterjee, received the American Auditory Society's Carhart Memorial Award.
- COBRE Phase II, Core Director, Dr. Karla McGregor, received the 2023 ASHA Honors of the Association Award.

Boys Town National Research Hospital Retirements



Doug Keefe, SENIOR SCIENTIST

Doug has retired after more than 27 years at Boys Town Hospital. He joined Boys Town in 1995. Doug directed the Physical Acoustics Laboratory since his arrival, playing a major role in establishing a hearing research program that is recognized as one of the strongest in the country.



Judy Kopun,

CLINICAL AUDIOLOGIST, RECRUITMENT COORDINATOR Judy has retired after more than 34 years at Boys Town Hospital. Judy began working at Boys Town Hospital in 1985 as a Clinical Audiologist. Throughout her tenure, she moved into research audiology, and coodinated participant recruitment.

We would like to thank Doug and Judy for all of their work and contributions over the years!

Alumni Updates



Kristen Janky, Au.D., Ph.D.

In the Vestibular and Balance Laboratory, we study the effects of vestibular loss in children with hearing loss. The vestibular system is responsible for decoding many types of head movements and sending information about movement to various muscles in the body. The vestibular part of the ear is connected to the hearing part of the ear. Therefore, some children with hearing loss have co-existing vestibular loss. When vestibular loss occurs in children, it can cause delays in gross motor development and can also affect clear vision during head movement. There is also some evidence that vestibular loss may affect reading and cognition. Our current project examines vestibular loss as a contributing factor to reading difficulties for children with hearing loss. Children who participate in this study complete measures of vestibular, balance, visual acuity, cognition, speech, language and reading function. Some measures are completed using eye tracking. These results are expected to influence the identification and habilitation of vestibular loss in children with hearing loss.



Gabrielle Merchant, Au.D., Ph.D.

Our work in the Translational Auditory Physiology and Perception (TAPP) Laboratory is currently focused on improving the diagnosis and understanding of ear infections and the hearing loss that can occur with ear infections. With support from the COBRE, our laboratory determined that the hearing loss associated with an ear infection is driven by how much fluid is present in the middle ear. We also developed a method using a simple, objective test of how the ear drum is moving, called wideband acoustic immittance, to determine how much fluid is present and estimate the amount of hearing loss present. This could be really useful because completing hearing tests in young children, where ear infections are most common, can be challenging.

Most recently, with support from a new grant from the NIH, we have begun taking our testing on the road to monitor ear infections and hearing loss over time to better understand stability and fluctuations associated with ear infections using a mobile testing van. Improvements in the diagnosis and prognosis of ear infections and its related hearing loss will help refine clinical protocols and improve outcomes for children.



Participate in Research 11 <u>boystownhospital.org/research/participate</u>



Heather Porter, Au.D., Ph.D.

Traditional hearing tests measure the softest sounds a person can hear from a range of low to high pitches. An alternative hearing test is needed for those unable to provide reliable responses to sound, such as infants or people with significant disabilities. For these vulnerable populations, auditory brainstem

response testing is used to estimate hearing sensitivity by monitoring the brain's response to sound. However, clinical protocols for auditory brainstem response testing include fewer pitches than traditional hearing tests despite evidence that the full range of pitches is important for speech perception and listening in background noise. A goal of our COBRE pilot grant, Clinical Normative Data for High-Frequency Auditory Brainstem Response Testing, was to expand the range of pitches that are included in clinical auditory brainstem response protocols. The research supported by the COBRE grant addressed 1) defined normative auditory brainstem response data for infants and 2) delineated the relationship between results from auditory brainstem response testing and traditional hearing tests. This means that clinicians have information showing what normal responses look like and how abnormal responses relate to degree of hearing loss. We were afforded the opportunity to share our results through two publications in peer-reviewed journals widely read by clinical audiologists and at a recent conference highlighting translational research in pediatric audiology.

Community Outreach

In Summer 2023, the Community Engagement Program organized three Research Day Camps for children aged7 to 14 years. The camps were a part of a Engagement & multi-lab coordinated effort which included both Hearing and Speech and Language research labs. IIn addition to participating in research studies, camp attendees attended Music and Arts workshops led by

artists from the Omaha Symphony and Rose Theater. Camp attendance was free for all camp attendees, and they were compensated for their participation in research studies. In 2024, week-long Research Camps will be held during Spring Break and in the Summer. In Fall 2023, the Research Participant Core's **Community Engagement Program partnered with the Omaha** Public Library (OPL) to offer free hearing and speech/language screenings immediately following the Sense Screening Storytimes at four OPL Branches (Elkhorn, Saddlebrook, South Omaha and Benson). Storytimes were tailored for children aged 1 to 7 years and explored early literacy skills of singing reading, talking and writing, and included ASL signs. The purpose of the library screenings was to provide community services, build trust and establish community relationships.



Boys Town Research Vehicle (BTRV) Hits The Road!

We have been excited to get the Boys Town Research Vehicle (BTRV) on the road and into our communities! Our primary motivation for building a "research lab on wheels" was to break down some of the barriers that make it difficult for members of rural and underrepresented groups to

participate in research.

This effort involves building partnerships with community organizations and traveling to underserved communities to invite more people to participate in research. Our recent partnerships include participation in the 2023 Buddy Walk sponsored by the Northwest Iowa Down Syndrome Society and the PACE (Police **Athletics for Community** Engagement) program in Omaha.



Town sites in North, Central and South Florida in February, to South Dakota in May and to North Carolina and Pittsburgh in July, providing hearing and language screenings and research opportunities for underserved children and families.

This year, we recently brought on three new team members to support our work with the BTRV.



Gage Beiro, part-time driver, is the primary driver for the BTRV, ensuring the safe transport of the trailer and supporting regular up-keep. Ray Dibelka, on-call driver is our on-call driver and technical consultant, bringing decades of experience driving big-rigs and towing valuable cargo (such as the statue of a large dairy cow). Nina Hjermstad, assistant project coordinator, (left) manages the day-to-day operations and logistics for the BTRV and supports researchers in developing their mobile research plans.



T35 Predoctoral Training Program



Sadie O'Neill (Towson University), Cora Swindale (Western Washington University), Aimee Miller (University of Florida), Jean Hong (University of Iowa), Marjan Davoodian (University of Maryland), Casey Vandervelde (University of Utah)

My Experience in the T35 Program by Aimee Miller, a student at the University of Florida The Boys Town T35 traineeship was transformative for me. I met like-minded peers, collaborated with worldrenowned clinicians and scientists during journal groups, training and lab meetings, and gained exposure to innovative research and best practices. Plus, I watched UF at the College World Series, went to the Henry Doorly Zoo, attended the inaugural PAT conference and explored Omaha's yummy food scene! The relationships cultivated during the T35 traineeship

transcend the summer—Boys Town is a family, and you'll continue to feel supported even after the summer has ended.

Lastly, I'll never forget my T35 experience because I learned my husband and I were expecting our first child while in Omaha!

"For those considering the Boys Town T35 program, I would enthusiastically shout from the rooftops, "Apply for the Boys Town T35 program!" Boys Town is an incredible establishment, and the opportunity to participate in professional development and meaningful research targeted toward individualized interests is unparalleled. Don't miss the chance to have the summer of a lifetime!"

For future predoctoral students:

The purpose of this training program is to provide a short-term, intensive research experience related to hearing, vestibular, cognition and/or speech/language sciences for audiology doctoral (AuD) students. Students will be matched with a mentor according to the students' interests and mentor availability. Other benefits of the T35 traineeship include:

- Weekly journal groups
- Local seminars and workshops
- Colloquia presentations by national and international experts in communication disorders
- A course on responsible conduct in research
- Access to all hospital faculty for informal discussions and consultations

- A course on responsible conduct in research
- Access to all hospital faculty for informal discussions and consultations
- Travel stipend to present the T35 research project during the Mentored Research Poster Sessions at the American Auditory Society meeting in sunny Scottsdale, Arizona the following spring

Learn more: boystownhospital.org/research/careers-training/short-term-research-aud

T32 Postdoctoral Training Program

2023 Postdoctoral Research Symposium

Boys Town National Research Hospital postdocs participated in the annual Postdoctoral Research Symposium, held at the Boys Town Headquarters. The day consisted of podium and poster presentations from the Center for Perception and Communication in Children, the Center for Childhood Deafness, Language and Learning, the Institute for Human Neuroscience, and the Child and Family Translational Research Center. The Symposium was created to build a sense of community for postdoctoral researchers to build a cohesive postdoctoral cohort and provide networking opportunities for future collaborations among Boys Town research centers. Attended by researchers, research staff and external collaborators, the day was a success! We look forward to the 2024 Symposium.

Apply for the Doctoral Program: <u>boystownhospital.org/research/careers-</u> <u>training/postdoctoral</u>

For Future Researchers

The goals of the postdoctoral training program are reached through a combination of supervised research, seminars and elective courses. NIH strongly encourages postdoctoral fellows to complete a minimum of two years of research training and limits stipend-supported training to a maximum of three years. At Boys Town Hospital, the T32 program provides an opportunity to those with doctoral degrees to develop and broaden their research capabilities in one or a combination of scientific disciplines related to human communication and its disorders. A number of exceptional features associated with the program are particularly advantageous to trainees, including:

- Clinical and laboratory experience
- Supervised research, seminars and elective courses
- Gain research experience in disciplines not directly related to their area of research
- A strong core support staff
- Encouraged to prepare and submit F32 postdoctoral fellowships
- NIH grant preparation

Participate in Research 15 <u>boystownhospital.org/research/participate</u>



Publications

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